

SOME CONSIDERATIONS AND PROBLEMS IN THE ECOLOGY OF FLOATING ISLANDS

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The late Dr. Thomas Barbour has said (1944:173), "In no region in the world is one more frequently interested and impressed by the floating vegetation than in Florida." In addition to the usual floating plants, many lakes throughout the state are noted for large floating mats of vegetation which, in some instances, support trees and shrubs 15 feet or more in height. Lake Washington, which heads the St. Johns River, Lake Hellen Blazes, and Orange Lake are probably the most notable examples.

Orange Lake is the largest of several lakes in north central Florida, and is a tributary of the St. Johns River. The climate in this rolling karst region is generally mild and comparatively uniform, with subtropical temperatures influenced by winds from the nearby Gulf of Mexico. A wet period occurs generally from June through September, with precipitation in the form of thunder-showers of high intensity and short duration. The dry period extends from October through May.

Orange Lake lies almost wholly within Alachua County. The lake has an open water surface area of approximately 14,000 acres surrounded by *Nymphaea* marsh. This marsh, much of which is floating, may be over a mile wide in places. The depth of the lake is fairly uniform, sloping gradually from an ill-defined shoreline to 25-30 feet. The water is usually tinted brownish or greenish due to large amounts of suspended detritus, zoo- and phyto-plankton, and their extractives. The bottom is composed of thick layers of autochthonous silt and plant detritus, which in some places is rather compact, overlying sandy clay and limestone. Chemically, the water is usually circum-neutral (pH: 6.8-7.2). Submergent plants are scarce in the open water.

Floating islands, varying in size from a few feet to several acres, are impressive features of Orange Lake. They usually support abundant stands of vegetation whose roots penetrate a rather dense matrix of decaying plant detritus of peat-like nature.

No particular hydrophyte appears to dominate all of the floating islands. Pickerel weed, *Pontederia lanceolata*, and arrowhead,

Sagittaria lancifolia, are probably the most characteristic forms, although many islands have been observed which supported dominating growths of twig rush, *Mariscus jamaicensis*, smartweed, *Persicaria* sp., or spatterdock, *Nymphaea macrophylla*, with elder, *Sambuccus simpsonii*, willow, *Salix* sp., and myrtle, *Myrica cerifera*, frequently present. An abundant lower stratum flora is usually present and consists of such plants as pennywort, *Hydrocotyl umbellata*, parrot's feather, *Myriophyllum proserpinacoides*, duckweed, *Lemna minor*, or mosquito fern, *Azolla caroliniana*. In season, much color is added to the islands by the flowers of *Bidens*, arrowhead, spider lilies, *Hibiscus*, and the ubiquitous water hyacinth.

The fauna of the islands, and, more properly, the marsh in general, is varied and quite abundant. This is especially true of the invertebrate groups.

Of the mammals, the raccoon, *Procyon lotor elucus*, has been observed wandering and swimming from island to island. Evidences of the marsh rabbit, *Sylvilagus palustris paludicola*, and the round-tailed muskrat, *Neofiber alleni nigrescens*, have been noted.

As would be expected, in view of the extensive shallow marshes about Orange Lake, birds are abundant, many of them finding food and nesting sites on floating islands. Bird Island, with an area of 2-3 acres, has been recognized since the turn of the century for its phenomenal bird fauna. Egrets, ibises, herons, gallinules, red-winged blackbirds, grackles, and water turkeys are some of the more characteristic breeding birds associated with floating islands. Coots and migratory ducks are common in the area.

Certain amphibians and reptiles are conspicuous elements in the biota of floating islands. Among the amphibians, the Louisiana newt, *Triturus viridescens louisianensis*, and the striped mud-eel, *Pseudobranchius striatus axanthus*, are often found among the submerged roots of the plants growing on the islands. Hyloid frogs (*Acris gryllus dorsalis*, *Hyla cinerea cinerea*, *Hyla squirella*) and bullfrogs (*Rana catesbeiana*, *Rana grylio*, *Rana sphenocephala*) occur in varying numbers. Turtles and snakes are associated with floating islands in the procurement of food and selection of nesting sites. The more common forms of turtles are the stink-jim, *Sternotherus odoratus*, which is frequently found nosing around submerged roots, and cooter, *Pseudemys floridana*, often seen sunning on logs

and edges of islands. The green water-snake, *Natrix cyclopion floridana*, and the Florida banded water-snake, *Natrix sipedon pictiventris*, are common inhabitants of the marsh and floating islands. Allen's water-snake, *Liodytes alleni*, and others of fossorial tendencies (*Farancia abacura abacura*, *Seminatrix pygaea pygaea*) burrow in the substrate. The lizard, *Anolis carolinensis*, is often at home hundreds of feet from shore on an island. Much of the food of these reptiles consists of vegetation, frogs, small fishes, and invertebrates which are abundantly associated with the islands.

Of 36 species of fishes which I have listed for Orange Lake (1950a), several show interesting affinities for floating islands. Among such, the topminnow, *Gambusia affinis holbrooki*, least killifish, *Heterandria formosa*, and darter, *Hololepis barratti*, which are usually considered littoral or bottom forms, are commonly found around the edges of islands some distance from shore. Black crappie frequently make their redds under the edges of islands which have become anchored or incorporated into the marsh.

Prodigious numbers of invertebrate animals are produced in the lush emergent vegetation and submerged roots of the plants of floating islands. Seasonally, diptera emerge in vast droves and aquatic hemiptera and coleoptera thrive in the shallow waters of the edges and surfaces of the islands. Nymphs of 12 species of Odonata have been taken from stomachs of black crappie (Reid, 1950b:149). A species of ant, *Tetramorium guineense*, appears to be characteristic of the emergent vegetation, and the spider, *Dolomedes*, is common. Crustaceans such as the amphipod, *Hyalella azteca*, and freshwater shrimp, *Palaemonetes paludosa*, occur in the submerged portions of the marsh and floating islands in quantities sufficient to cause these organisms to be major items in the diet of many young and adult fishes.

Quite naturally, several explanations for the genesis of floating islands are at hand. Barbour (*op. cit.*, 173-174) says that fluctuations in water level float the dense tangled masses of vegetation bordering the water, and, once floating, the mats are made lighter by having the bottom of the mat scraped off by the lake bottom. Another explanation is that of the mat being made to float due to the buoyancy offered by the air chambers in the roots of many plants growing on the islands, that these islands were originally outer edges of littoral marsh which became broken off from the

main mass. Still another theory conceives of varying sized mats of peat-like material, composed mostly of *Nymphaea* roots, being floated from the bottom of the lake as the result of accumulations of gases of decomposition, these mats being invaded later by vegetation.

The apparent fate of floating islands in Orange Lake is to become incorporated into the marsh, where they continue to contribute to the productivity of the lake. Some have been observed to die and sink.

The preceding description of the general aspects of the biota of floating islands has, of necessity, included only the most conspicuous elements in the ecological relationships existing throughout the lake as a major community, or microcosm, and the marsh and floating islands as lesser communities. From what has been presented, innumerable ecological problems become apparent at once. Studies could be undertaken to determine something of (1) the oxygen-carbon dioxide relationships of the plants and animals on, in, and underneath the islands, (2) the intricacies of lacustrine food chains from the rich organic detritus stratum to the higher animals, (3) the physical, chemical, and biological requirements in the life cycles of the myriads of plants and animals, and (4) the assemblage of animals, some of which might be hitherto unreported for this ecologic niche, or biotope.

All of these, and other relationships, present an intriguing challenge for more detailed examinations of the many facets in the ecology of floating islands.

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